Influenza
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Influenza

Overview[1,2]

For a complete description of influenza, refer to the following texts:

- Control of Communicable Diseases Manual (CCDM).
- Red Book, Report of the Committee on Infectious Diseases.

Case Definition[3]

Clinical description
Influenza is an acute viral disease of the respiratory tract characterized by abrupt onset of fever, myalgia, headache, severe malaise, nonproductive cough, sore throat and rhinitis. Without laboratory confirmation, influenza is referred to as "influenza-like illness" (ILI)

Clinical case definition
Without laboratory confirmation, the ILI case definition used by CDC for national surveillance is fever $\geq 100^0$ Fahrenheit or 37.8^0 Celsius **and** cough and/or sore throat (in the absence of a known cause). Influenza is commonly recognized by epidemiologic characteristics. Influenza illness may be indistinguishable from other viral respiratory illnesses based on symptoms alone.

Laboratory criteria for diagnosis

- Virus isolation by cell culture
- CLIA certified laboratory Immunofluorescence, Influenza Enzyme Immuno Assay (EIA), or Reverse transcription-polymerase chain reaction (RT-PCR[5])
- CLIA waived Commercial rapid non-culture diagnostic tests for influenza virus
- *Four-fold rise in antibody titer between the acute and convalescent serum specimens.

Case classification
*Confirmed***:** a case that is laboratory confirmed by virus culture, rapid diagnostic tests, or a four-fold rise in antibody titer between the acute and convalescent serum.

* Note: Serology tests available from reference laboratories that rely on the results of a **single** acute serum specimen**, are not be considered confirmatory**.

Information Needed for Investigation

Verify the diagnosis. What laboratory tests were conducted? What were the results? What are the case's clinical symptoms?
Establish the extent of illness. If the patient works outside the home, attends school or childcare, or resides in a health care facility, determine if co-workers, schoolmates, other patients, or family members have been ill with the same set of symptoms. This can be done by questioning the patient, the patient's family, the school or childcare facility, or the health care facility management.
Contact the Regional Communicable Disease Coordinator when an outbreak is suspected, or when cases are in high-risk settings such as health care facilities or among the children or employees of child care centers.
Contact Bureau of Child Care when cases are associated with childcare facilities at 573-751-2450.
Contact Long Term Care Regulation of Senior Services and Regulation when cases are associated with Long Term Care facilities at 573-526-8570.

Case/Contact Follow Up And Control Measures

Determine the basis of the diagnosis. If the case is the first confirmed case of the influenza season or a suspected outbreak, call or fax this information to the Regional Communicable Disease Coordinator or the State Influenza Coordinator.

If an outbreak is reported at a school, hospital, nursing home, or other group setting, and the facility is unable to arrange for rapid diagnostic influenza testing, contact the Regional Communicable Disease Coordinator or the State Influenza Coordinator to arrange for viral culture kits from the Missouri State Public Health Laboratory (SPHL). Instruct the facility to properly collect throat swabs of symptomatic patients, residents or staff, and send the specimens to the SPHL for virus culture testing and strain identification.

Control Measures
See the Influenza section of the Control of Communicable Diseases Manual (CCDM), "Control of patient, contacts and the immediate environment".
See the Influenza section of the Red Book.

Refer to the Morbidity and Mortality Weekly Report (*MMWR*), Prevention and Control of Influenza: Recommendations of the Advisory committee on Immunization Practices (ACIP). (This is published annually in April at: http://www.cdc.gov/nip/publications/ACIP-list.htm

Note:
Notify area nursing homes and residential care facilities when a laboratory confirmed case of influenza is reported. This will allow them to prepare for an outbreak in the institution and reduce nosocomial transmission

Laboratory Procedures

Specimens:

- **For influenza virus isolation, the most common specimen is a simple throat swab. However, nasal wash or pharyngeal swabs and aspirates generally improve the quantity and the quality of the viral specimen submitted, leading to improved testing accuracy.** Viral culture testing is considered the gold standard and is performed at the SPHL. This avenue of testing is available during outbreaks and for Missouri physicians participating in the U.S. Influenza Sentinel Physician Surveillance Network. Viral culture testing may take up to 3 weeks for strain identification, therefore is not suitable for diagnosis in determining treatment options. **Viral cultures:** Respiratory specimens should be collected in the acute stage of the illness, kept moist, and refrigerated immediately. Whenever possible, specimens should be shipped so they will **not** arrive in the laboratory over the weekend. The specimen swab should be broken off into the medium and sent in the medium to the laboratory in the Styrofoam culture kit box and a **frozen** freeze pillow. (See the procedure to follow for submitting virus isolation specimens for influenza testing).
- Contact the Regional Communicable Disease Coordinator when viral culture testing is indicated for a facility or community outbreak. Viral specimens should be collected on patients within the first 4 days of illness. The ideal time for viral culturing is within the first three days of symptom onset.[4] Be sure to label the specimen with the date of collection and the patient's name.
- **Rapid Diagnostic Tests.** The sensitivity and specificity of these rapid tests is usually dependent on the type of test, the quality of specimen collected, and on the amount of virus collected in the specimen. Pharyngeal swabs and nasal washes or aspirates yield the best specimens, as these will contain more mucous and cellular material than a throat swab. Many of the rapid tests are done in physicians offices and are now on the CLIA waived test list.[5] Depending on the product, these tests can detect the presence of influenza A/B undifferentiated, influenza type A alone, or influenza type B alone in throat swabs or nasal wash specimens. The specimen must be collected early in the onset of the illness and contain sufficient cellar material and mucous to receive reliable results.
- **Blood**. Blood serology may be used for laboratory confirmation of influenza. If a unique or a new strain (subtype) of influenza virus is suspected, this method may prove valuable. The laboratory diagnosis will be based on a four-fold rise in antibody titer between the acute and convalescent specimens of serum. CDC laboratories do a limited number of specialized serology tests each year. **CALL** the Regional Communicable Disease Coordinator or the State Influenza Coordinator at the Section for Communicable Disease Prevention for direction before collecting serum specimens. The serum specimens must be sent as a pair, the containers marked with patient's name, and identified as acute or

convalescent. The SPHL will fill out two D.A.S.H. lab flow sheets (CDC 50.34) to send with these specimens.

- A single serum specimen will not be recognized.
- For questions regarding viral specimen collection, see attached "Procedure to Follow for Submitting Virus Isolation Specimens for Influenza Testing." This procedure is provided with each influenza viral culture kit mailed out by the SPHL

Reporting Requirements

Laboratory Confirmed Influenza is a Category II disease and shall be reported to the local health authority or the Missouri Department of Health and Senior Services within 3 days of identification.

1. For viral culture confirmed cases, complete a "DHSS Disease Case Report" form (CD-1). For positive rapid antigen tests, a laboratory report with a complete patient address will suffice.
2. Entry of the completed CD-1 into MOHSIS negates the need for the paper CD-1 to be forwarded to the Regional Health Office.
3. For school or child care closures / outbreaks complete the "Influenza Outbreak/School Closure Information form" and forward the completed document to the Regional Health Office or the State Influenza Coordinator.
4. For outbreaks in health care facilities, nursing homes, residential care facilities, or rehabilitation facilities, complete the "Influenza Investigation Report" and forward the completed document to the Regional Health Office or the State Influenza Coordinator.
5. An outbreak summary should be submitted within 90 days from the conclusion of the outbreak:
   - When the outbreak occurs in health care facilities, nursing homes, residential care facilities, rehabilitation facilities, or
   - When significant resources are applied by either the Local or State Health Department to intervene with the outbreak.
6. Submit the final outbreak summary to the Regional Communicable Disease Coordinator or the State Influenza Coordinator.

References

1. Chin, James, ed. "Influenza." Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association, 2000: 270-276.
2. American Academy of Pediatrics. "Influenza." In: Pickering, LK. & et al. ed. 2000 Red Book: Report of the Committee on Infectious Diseases. 25th ed. Elk Grove Village, IL. 2000: 351-359.
3. Centers for Disease Control and Prevention. Prevention and Control of Influenza. Recommendations of the Advisory Committee on

Immunization Practices (ACIP). MMWR April 25, 2003 / Vol. 52 (RR-08); 1-36.

4. Glezen, W. Paul and Robert B. Couch "Influenza Viruses." Viral Infections of Humans. Ed. Alfred S. Evans and Richard A. Kaslow. 4th ed. New York: Plenum, 1997: 473-496.
5. CLIA Waived Test List (By Specialty/Subspecialty), CAP Laboratory Improvement Publication, Updated October 23, 2001.
6. Missouri Department of Health and Senior Services State Public Health Laboratory: Procedure for submitting virus isolation specimens for influenza testing.

Other Sources of Information

Web Sites

1. Centers for Disease Control and Prevention, Flu Season. http://www.cdc.gov/nip/Flu/default.htm. (26 June2002)
2. Morbidity and Mortality Weekly Report (*MMWR*), "Prevention and Control of Influenza: Recommendations of the Advisory committee on Immunization Practices (ACIP)," 25 April 2003. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5208a1.htm. (26 July 2003).
3. Centers for Disease Control and Prevention, Disease Information, "Influenza" http://www.cdc.gov/ncidod/diseases/flu/fluinfo.htm (26 July 2003)
4. Centers for Disease Control and Prevention, Influenza Branch, "Influenza Summary Update" http://www.cdc.gov/ncidod/diseases/flu/weekly.htm (22 May 2003).

Influenza

FACT SHEET

What is influenza?

Influenza is a highly contagious respiratory illness caused by a virus. Three specific influenza virus strains are responsible for illness in humans. Influenza type A and type B viruses cause moderate to severe illness in humans, and type C may cause no symptoms or only a mild respiratory illness. Influenza types A and B viruses circulate almost every winter. Each influenza type has a different nuclear make up. Type A influenza generally causes moderate to severe illness and infects both humans and animals such as pigs and birds. Type B only affects humans, primarily affects children and generally causes milder illness than influenza A. Influenza season usually begins in October and continues thru the following May, but tends to peak between November and March. Influenza can occur throughout the year particularly in tropical areas, but in temperate regions like the United States, influenza tends to occur in the fall and winter. In the Southern Hemisphere, influenza generally peaks from April through September. Travelers also can get the flu during the summer, especially when traveling to areas of the world where the flu is active.

What are the symptoms?

The abrupt onset of fever often associated with headache, extreme tiredness, dry cough, sore throat, nasal congestion, and body aches are characteristic of influenza illness. Occasionally, intestinal symptoms such as nausea, vomiting, diarrhea, and abdominal pain may be present (especially in children), but should not be confused with the "stomach flu."

How is influenza spread?

Influenza is spread from person-to-person by direct contact with the airborne particles or large droplets from the respiratory tract of an infected person. When someone who is infected with influenza coughs, sneezes, talks or sings, the virus is expelled into the air, and the droplets drift and or settles on objects in the environment. Transmission of the virus occurs when you breathe the particles or large droplets, or when you touch objects recently contaminated with influenza virus and then touch your nose or mouth. Avoiding or limiting contact with those infected with influenza, washing your hands often, using tissues to catch sneezes and coughs, and getting a flu shot each year reduces your risk of infection and serious influenza related illness.

How soon do symptoms appear?

Symptoms of influenza usually appear one to five days after exposure and generally last from two to five days with a rapid recovery. Cough and decreased strength may linger for two weeks or longer.

How long can a person spread influenza?

Persons are most contagious during the 24 hours before symptoms appear and five days or so thereafter.

How is influenza diagnosed?

Health care providers often diagnose influenza based on symptoms alone. Influenza virus can also be detected in specimens collected from the nose or throat by specific laboratory procedures such as viral culture or rapid influenza diagnostic antigen testing. *Rapid* influenza tests are now available for use in health care providers' offices.

What is the treatment?

Basic treatment includes bed rest, fluids, and over-the-counter medications for the relief of symptoms such as: a runny nose, cough, sore throat, fever, and body aches. Infants, children, or teenagers **should not use aspirin** to treat influenza symptoms because of the risk for developing Reye Syndrome, a serious condition associated with the use of aspirin during the course of a viral illness.

Antiviral medications may prevent or reduce the severity and shorten the duration of influenza. Amantadine and rimantadine have been approved for the prevention and treatment of influenza A. Oseltamivir and zanamivir has been approved for the prevention and treatment of influenza A and B. Antiviral medications require a prescription, may have side effects and are not appropriate for everyone. There are quidelines governing the age appropriate use of these antivirals in children. Consult your health care provider as to whether or not anti-viral medication is right for you and your family.

How serious is influenza?

Generally, influenza runs a predictable course over two to seven days. Although a cough and malaise may persist for a couple of weeks, the illness is generally self-limiting and recovery is complete. Influenza can be especially serious for infants, the immunocompromised, the elderly, and anyone with underlying cardiac, respiratory, or other serious health conditions. On average, 1,000 deaths occur each year in Missouri because of influenza related complications. Complications generally associated with influenza include: bronchitis, viral pneumonia, secondary bacterial pneumonia, aggravation of asthma, congestive heart failure, diabetes and other chronic illnesses, and sinus and ear infections.

Can influenza be prevented?

When the influenza vaccine matches the influenza strains in circulation, it is 70% to 90% effective in preventing illness among healthy adults under the age of 65. It is 30% to 70% effective in preventing hospitalization for pneumonia and influenza complication among the elderly living outside of nursing or chronic care facilities. It is 50% to 60% effective in preventing hospitalization and pneumonia, and 80% effective in preventing death among the elderly living in nursing or chronic care facilities.

Influenza vaccine is updated annually to match the circulating strain as closely as possible. Annual vaccination provides immunity for approximately one year.

During community outbreaks of influenza, persons who are unable to take the influenza vaccine may use antiviral medications. Antiviral medications are also indicated when outbreaks are caused by a variant strain of influenza type A that might not be controlled by the vaccine.

When is the influenza vaccine given?

The vaccine should be taken each fall, from October through November. Vaccination may continue into December and throughout the influenza season, even after influenza has come to your community. However, to avoid missed opportunities for vaccination, vaccine should be offered to high-risk persons who are hospitalized or seen at their physician's office starting in September and continuing through the winter. **It takes about one to two weeks after vaccination for antibody against influenza to develop and provide protection.**

How safe is influenza vaccine?

The Influenza vaccine does not contain live viruses, so it cannot cause influenza. The most common reaction is soreness where the shot was given. Some persons may have muscle aches, tiredness, and low-grade temperature for one to two days.

Who should get influenza vaccine?

1. Persons who have a greater risk for developing complications from influenza, include:
    - Persons aged 65 years and older
    - Persons living in nursing or other chronic-care facilities
    - Adults and children with chronic heart or lung conditions, including children with asthma
    - Adults and children who are immunosuppressed for any reason, including immunodeficiency (HIV) virus or who are taking certain medications
    - Adults and children who require regular medical follow-up because of chronic metabolic disease (including diabetes mellitus), kidney disease, or blood disorders
    - Children and teenagers, aged six months to 18 years, who are receiving long-term aspirin therapy and might be at risk for developing Reye syndrome after influenza
    - Women who will be in the second or third trimester of pregnancy during the influenza season
    - Persons who are aged 50-64 years of age may be at increased risk of developing complications from influenza because of known or unknown underlying medical conditions

2. Persons who can <u>spread</u> influenza to those who are at risk of developing complications from influenza:
    - Persons who live with or care for high-risk individuals
    - Out of home caretakers and contacts of children aged 0-23 months
    - Health care workers, physicians, staff and volunteers of health care facilities and home health agencies
    - Public-safety workers such as, police, firefighters, and emergency medical technicians
    - Healthy children six months to 23 months are at increased risk of influenza-related hospitalization, and should be considered for vaccine when feasible

(Consultation with your physician is advised prior to administration of the vaccine). Vaccine safety has not been established for children less than six months of age and is not recommended.

3. Persons who want the vaccine:
    - College and university students and travelers to foreign countries
    - Persons who wish to avoid influenza illness

Who should NOT get influenza vaccine?

Persons having the following conditions should NOT receive the influenza vaccine:

- Persons who have had a severe allergic reaction to one of the influenza vaccine components following a prior dose; such as thimerosal or eggs
- Persons who have had severe reactions, such as hives or swelling of the lips, or tongue, after eating eggs should consult their health care provider before considering the influenza vaccine
- Fever or an active infection
- Persons with a history of Guillain-Barre' Syndrome should consult their health care provider before receiving the influenza vaccine

For more information about influenza, ask your physician or health care provider, pharmacist or contact your Local Health Department or DHSS at:

Missouri Department of Health and Senior Services
Section for Communicable Disease Prevention
Phone: (866) 628-9891 or (573) 751-6113

Missouri Department of Health and Senior Services
Section for Communicable Disease Prevention
Influenza Outbreak/School Closure Information Form

School Name: _____

City: _____

County: _____

Date(s) Closed: _____

Enrollment: _____

Number Absent: _____ **OR Percent Absent** _____

Grades/Buildings Involved: _____

Symptoms: (Check symptom manifestation of illness)

Fever_____ **Headache_____** **Cough_____**

Runny Nose_____ **Sore Throat_____** **Muscle Aches_____**

Other: _____

_____

_____

Missouri Department of Health and Senior Services
Section for Communicable Disease Prevention
Phone: (573) 751-6113
FAX: (573) 526-0235

Missouri Department of Health and Senior Services
Section for Communicable Disease Prevention
Influenza Investigation Report*

Facility Name:_____ Type of Facility: _____

Street Address: _____ City: _____

County: _____ Zip Code: _____ Telephone: _____

Contact Person: _____

1. Total resident population: _____ Total number of employees: _____

2. Number of ill residents: _____ Number of ill employees: _____

3. Symptoms: (check all that apply)
   _____ cough _____ malaise _____sore throat _____ headache _____ fever

   _____ aching Other _____

4. Range of onset Dates: _____ (Please make an epi-curve histogram)

5. Duration of illness (Range): _____ (Hours, Days, Weeks) (circle one)

6. Is the episode still continuing: YES/NO

7. Total number receiving flu vaccine (whether ill or well): Residents _____ Employees _____

8. Total number of ill who received flu vaccine: Residents _____ Employees _____

9. Date range when majority of vaccine administered: _____

10. Number hospitalized: Residents _____ Employees _____

11. Number related deaths: Residents _____ Employees _____

12. Location of cases (by wing, hall, floor, job duty, or was it throughout the institution) and the number of cases at each location:

_____

_____

13. Control measures: _____

14. Number of throat/nasopharyngeal cultures: Residents: _____ Employees: _____

15. Number of positive cultures: Residents: _____ Employees: _____

16.Comments:_____

_____

_____

Viral culture kits may be provided FREE OF CHARGE, to determine the cause of illness during a influenza-like illness outbreak. Arrangements must be made with the State Public Health Laboratory. Please contact your District Communicable Disease Coordinator as soon as possible to make arrangements or call the State Influenza Coordinator at the Missouri Department of Health and Senior Services at (573) 751-6113.

* This document can be used to report outbreaks of influenza in settings such as: health care facilities, nursing homes, residential care facilities, and rehabilitation facilities.

Missouri Department of Health and Senior Services
P.O. Box 570, Jefferson City, MO 65102-0570 Phone: 573-751-6400 FAX: 573-751-6010

Richard C. Dunn
Director

Bob Holden
Governor

MISSOURI STATE PUBLIC HEALTH LABORATORY
307 WEST MCCARTY, JEFFERSON CITY, MO 65101
PHONE# 573/751/0633
FAX# 573/526/2754

PROCEDURE TO FOLLOW FOR SUBMITTING VIRUS ISOLATION SPECIMENS FOR INFLUENZA TESTING:

Upon receipt of the virus shipping containers, place freeze pillows in freezer and keep frozen until specimens are ready to be shipped. Keep transport media in refrigerator until ready to be used.

COLLECTION OF SPECIMEN

Throat swab: Carefully rub the posterior wall of pharynx with a dry sterile Dacron swab. The swab should not touch the tongue or buccal mucosa. Break off swab tip into a vial of transport medium. Screw the cap tightly. Keep the specimen cold (4*C) pending shipment.

Tryptose Phosphate Broth (TPB) is the virus transport media to be used for Influenza testing and is supplied by the Department of Health.

NOTE: Any time a swab is used, please make sure that the swab tip is broken off enough to allow the cap of the media tube to screw tightly. If the swab is too long, the cap will not fit tightly, the media will leak out and we will not be able to test the specimen**. MAKE SURE ALL SPECIMENS ARE LABELED WITH THE PATIENT'S NAME. ALL SPECIMENS RECEIVED WITHOUT PATIENT NAMES WILL BE DISCARDED WITHOUT TESTING.**

TEMPORARY STORAGE OF SPECIMENS FOR VIRUS CULTURE

In order to ensure the accuracy, relevance and validity of our testing and the reports, specimens that are not received within 7 days of collection will not be tested unless the specimen has been kept at –70*C and shipped with dry ice. Specimens should be shipped to the State Laboratory as soon as possible. During temporary storage remember that freezing and thawing is hard on virus survival. It is best to keep the specimens at refrigerator temperature during temporary storage. At warmer temperatures virus survival is short.

PACKING FOR SHIPMENT OF SPECIMENS FOR VIRUS CULTURE

Place refrigerant pillows in Styrofoam box. Pillows must be frozen when box is packed for shipment to maintain specimens at proper temperature.
Place specimens in safety container provided in Styrofoam container with freezer pillows.
Close lid on Styrofoam box and place completed form on top of Styrofoam box.
Place Styrofoam box inside cardboard box and tape shut. Do not use ice made with water when shipping by carrier.

SHIPMENT OF SPECIMENS FOR VIRUS CULTURE TESTING

Determine method of shipment (bus, mail or courier) that will get specimens to this Laboratory in the shortest length of time, scheduling so that the package is not left in a station or post office for a long period of time. If possible, select the method of shipment so that the specimen will not arrive in Jefferson City on Saturday, Sunday or a holiday and so they will arrive prior to 5:00 p.m. on regular working days**. DO NOT SHIP CLINICAL SPECIMENS BY UPS.**

PLEASE DO NOT USE THESE CONTAINERS FOR OTHER THAN SHIPMENT OF VIRUS SPECIMENS TO THIS LABORATORY. THERE IS A SUPPLY.